Ground Station Wireless Data-link User Manual

V 2.2

www.dji-innovations.com

Disclaimer

Please strictly follow these steps to install all the hardware and software products. Dajiang Innovations Technology Co. Ltd. assumes no liability for damage(s) or injured incurred directly or indirectly from the use of this product.

Profile

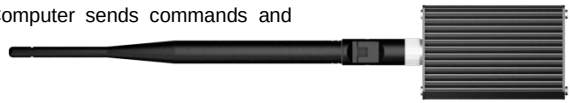
Thank you for purchasing DJI product. Please read this instruction thoroughly for proper operation of your new DJI Ground Station. Full featured DJI Ground Station enables 3-D Map Way Points Editing, Flight Path Planning, Real-time Flight State Feedback and Auto Takeoff and Landing. This product is specially designed for the purpose of aircraft operation, BVR (Beyond Visual Range) flying in applications such as surveillance, aerial photography, etc. Working with DJI autopilot system, DJI Ground Station not only ensures stable performance and safety of the aircraft, easy operation for the pilot, but also allows the aircraft to fly along the flight path set before or modified during the flight mission in the Ground Station software autonomously. This manual covers both Single Waypoint and Ground Station products. Read this manual according to your product package. E.g., if you have WKM Single Waypoint, then you do not need to read section 4.4. Please refer to DJI autopilot manual for semi-auto takeoff and landing.

Feature Chart				
	View Mode	**Joystick / Keyboard Mode**	**Click Go Mode**	**Waypoint**
3D Map Display	●	●	●	●
Real-time Flight Monitoring	●	●	●	●
Flight Simulation		●	●	●
One Key Takeoff (WKM)		●	●	●
Joystick / Keyboard Mode		●	●	●
One Key Go Home			●	●
Click Go Mode			●	●
Waypoints Editing				●
Automatic Takeoff and Landing				●
F Channel Controller				●
General Purpose Servo Action				●
6 Route Templates				●
Photogrammetry Tool				●
Supported Autopilot Systems				
Ace	●	●	●	●
WKM	●	●	●	
Product Package				
Single Waypoint	●	●	●	
Ground Station	●	●	●	●

In Box

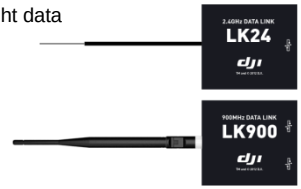
Wireless Data-link Ground End ×1

It connects to your computer. Computer sends commands and receives flight data through it.



Wireless Data-link Air End 900MHz ×1 or 2.4GHz ×1

It connects to DJI autopilot system. Autopilot system sends flight data and receives commands from computer by it.



Ground Station Install CD ×1

It contains Ground Station and all required software installation files.

USB Cable ×1

For connection between wireless data-link ground end and computer

Power Cable ×1

For supplying power to wireless data-link air end from battery.

4-pin Cable ×1

For connection between wireless data-link air end and autopilot system.

Warranty Card ×1

It recommends the necessary conditions for using this system and related safety issues. Please fill out the customer & multi rotor information card and return to DJI to register your product warranty.

Contents

Profile 3

In Box 4

Contents 5

Matters Need Attention 7

Connection 8

Ground Station Software 9

- Install Software 9
- Start Software 10

Application 11

- Control Mode Switch 11
- GUI 12
- 1 View Mode 15
  - 1.1 System Setting 15
  - 1.2 Altitude Offset Setting 17
- 2 Joystick/Keyboard Mode 18
  - 2.1 Simulator 18
  - 2.2 One Key Takeoff 18
  - 2.3 Joystick and Keyboard 19
- 3 Click Go 22
- 4 Waypoint (Single Waypoint User Skip This) 23
  - 4.1Waypoint Mode 23
  - (I) Flight Mission Setting 26
  - (II) Upload Flight Mission 30
  - (III) Take off Aircraft 30
  - (IV) Switch to Autopilot Mode 30
  - (V) GO!! 30
  - 4.2 Auto Takeoff and Landing 31
  - 4.3 F Channel Controller 32
  - 4.4 General Purpose Servo Action (GP-Servo Action) 33
  - 4.5 6 Pre-Programmed Route Templates 34
  - 4.6 Photogrammetry Tool 36

Appendix 37

- List of Ground Station Shortcut Keys 37

Troubleshooting 38
Data-link LED Introduction.....41
Wireless Data-link Specification.....42

Matters Need Attention

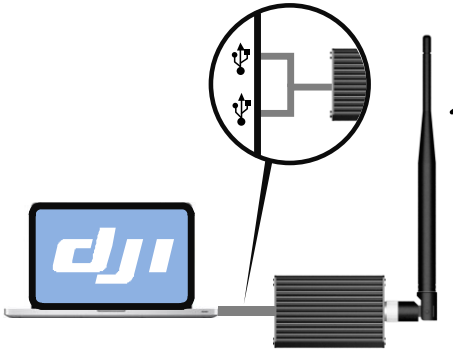
1. The ability of penetrating of radio signal from 2.4GHz wireless data-link is weak, please make sure the antenna of it is always visible to the ground end during the flight. Human body, trees, buildings or hills will stop the communication between air end and ground end.
2. You'd better put the ground end at high place. This can guarantee a good communication range.
3. Make sure the antenna head of air end is erect down, and the antenna head of ground end is erect up. Make sure there is no obstacle between antennas; otherwise the communication range will be reduced.
4. Ground end Link-Alarm red light on is distance alarm, red light off is safe. When it is on, you'd better return your aircraft.
5. When ground end Link-Alarm green light is off, this indicates the communication between ground end and air end is off, whatever the state of red light.
6. Make sure the driver is installed correctly.
7. Please choose the right com port.
8. Check out the power supply of wireless data-links before use.
9. Please close the DJI assistant software before open the ground station. Otherwise there will be port conflict.
10. Make sure the distance between 2.4GHz ground end and air end is over 1.5m; Make sure the distance between 900MHz ground end and air end is over 5m.
11. Use the right cable for connection.
12. High voltage servos & FBL systems can drain the flight battery fast. Please make sure your flight pack is sufficient for the flight time intended.
13. Autopilot Mode means: GPS Atti. or GPS Cruise Mode in Ace; GPS Atti. Mode in WKM.

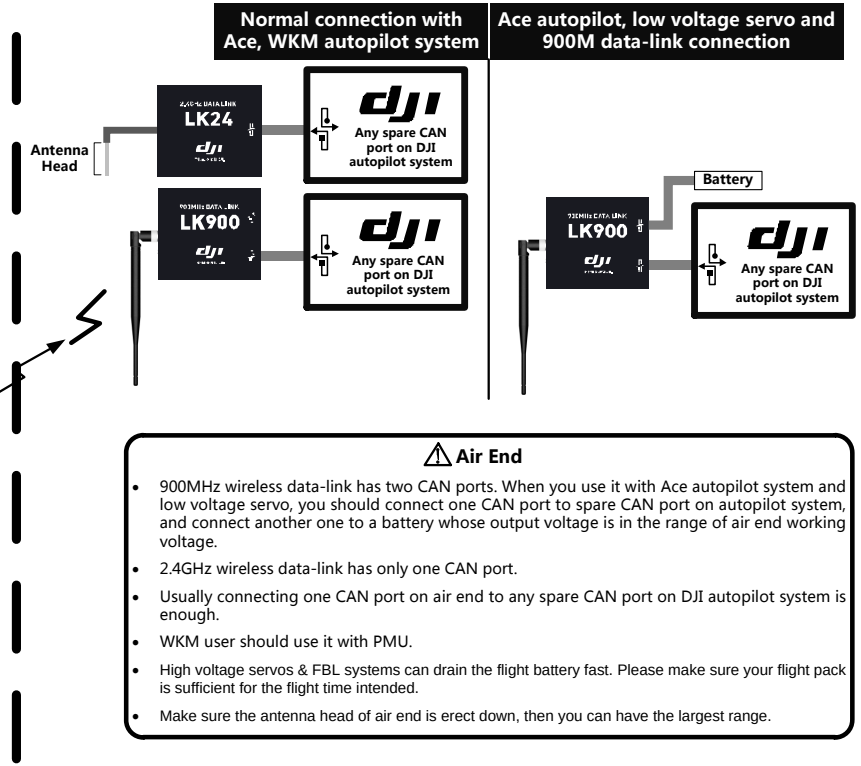
If you have any problem you cannot solve during installation and usage, please contact our customer service.

Connection

⚠ Ground End

- You should have a DJI Ground Station installed laptop
- Use the USB cable supplied by us to connect the ground end to you laptop. One end of the USB cable has two heads, make sure both of them are plugged into your laptop.




Normal connection with Ace, WKM autopilot system
Ace autopilot, low voltage servo and 900M data-link connection
Antenna Head
LK24
LK900
Any spare CAN port on DJI autopilot system
Any spare CAN port on DJI autopilot system
Battery
LK900
Any spare CAN port on DJI autopilot system

⚠ Air End

- 900MHz wireless data-link has two CAN ports. When you use it with Ace autopilot system and low voltage servo, you should connect one CAN port to spare CAN port on autopilot system, and connect another one to a battery whose output voltage is in the range of air end working voltage.
- 2.4GHz wireless data-link has only one CAN port.
- Usually connecting one CAN port on air end to any spare CAN port on DJI autopilot system is enough.
- WKM user should use it with PMU.
- High voltage servos & FBL systems can drain the flight battery fast. Please make sure your flight pack is sufficient for the flight time intended.
- Make sure the antenna head of air end is erect down, then you can have the largest range.

Ground Station Software

Install Software

- Operating system requirement: Windows XP, Vista, 7 (32-bits only);
- Adobe® Reader® is required for user manual reading;
- Please follow the following install procedure strictly to install all required software.

Insert the CD to CD-ROM, auto-run window will appear.

STEP1: Check if .Net Framework 3.5 has been installed. If not, click Install .Net Framework 3.5 to install. If yes, go to step 2.

STEP2: Check if Internet Explorer 8 has been installed. If not, click Install Internet Explorer 8 to install. If yes, go to step 3.

STEP3: Click Install Google Earth Plugin For DJI to install Google Earth.

STEP4: Click Install GS Radio USB Driver to install driver.

STEP5: Click Install DJI Ground Station to install GS

STEP6: Click Exit to finish installation.

Start Software

Start Window

(1) Start the Application of GS

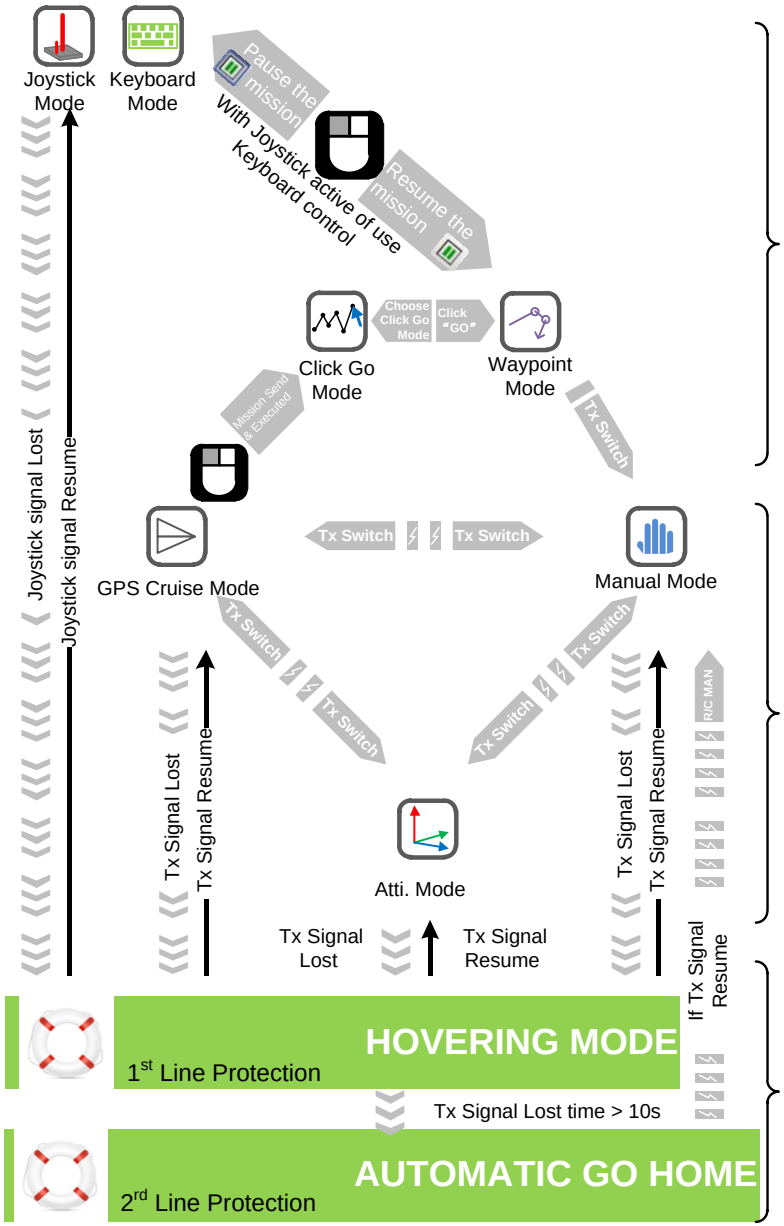
- Network Detection, if the Network connection fails, it will go offline mode automatically.
- You also can go into OFFLINE MODE by clicking the offline mode button.

(2) Connect to Main Controller

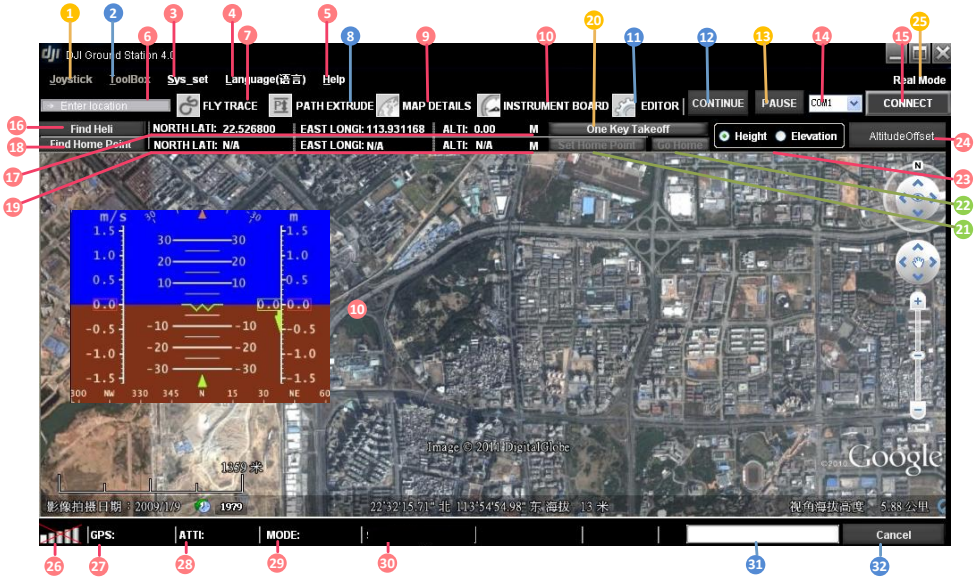
- Click Connect button on the upper right corner to connect to DJI autopilot main controller.
- If errors are showed, it means there may be some problem on connection, please check.

Application

Control Mode Switch



GUI



GUI Instruction

1. Joystick:
   - ➔ Stick: Choose your input equipment.
   - ➔ Choose Calibration: Joystick calibration.
   - ➔ Channel Mapping: Joystick channel mapping.
2. ToolBox:
   - ➔ Click Go Mode: A real-time single waypoint function.
   - ➔ F_Channel Controller: Customize F channels' function of Main Controller.
   - ➔ Relative Coordinates Editor: Add a new waypoint relative to current waypoint.
   - ➔ Route Template: Route library.
   - ➔ Action Config: General purpose servo action configuration.
   - ➔ Photogrammetry Tool: Photogrammetry toolbox.
3. Sys_set →Options:
   - ➔ Basic Setting:
     - Sound: Turn on or off the sound.
     - Instrument Board Style: Choose different style of the Instrument Board.
     - Action Setting: Action number display interval.
     - Pause Mode Control Interval: Frequency of data packages sent to MC.

- Target Line: Line between aircraft and current target.

➔ Data Link Setting:

- The waypoint number of one package.
- Upload one package.
- Retry one package timeout.

4. Language(语言): Click to change language, English or Chinese.

➔ 中文.

➔ English.

5. Help:

➔ Check for Update: Update software here.

➔ About: Check your DJI Ground Station version here.

6. Enter location: Go to the location of your input.

7. Fly Trace: Click to show the trace of aircraft.

8. Path Etrude: Click if you want to see flight Path Extrude during mission editing.

9. Map Details: Click to see map details.

10. Instrument Board: Click if you want to display instrument board.

11. Editor: Click if you want to display mission editor.

12. Continue: If you switch into autopilot mode from waypoint mode, click Pause then click Continue, the aircraft will continue the remaining (Unfinished) mission.

13. Pause:Mission pause.

14. Serial port selection.

15. Connect: Click to connect to main controller.

16. Find Aircraft: Click to find aircraft location.

17. Real-time coordinates of aircraft.

18. Find Home Point: Find your home location.

19. Real-time coordinates of home location.

20. One Key Takeoff: Click to take off the aircraft.

21. Set Home Point: Change your home point.

22. Go Home: Click to go home.

23. Height: Height mode.

Elevation: Elevation mode.

24. Altitude Off Set: Set up the altitude off set.

25. To show Real mode or Simulation mode.

26. Signal strength: Shows the connection state between controller and ground station

27. GPS: Real-time GPS signal quality.

28. ATTI: Real-time attitude quality.

29. MODE: Real-time control mode.

30. Other state parameters: Decided by the autopilot system you

- ➔ WKM:
  - Motor Voltage: Battery voltage;
- ➔ Ace:
  - Servo Voltage: Servo output voltage;
  - Pitch: Real-time pitch percentage.
  - Throttle: Real-time throttle percentage.

31. Download and upload progress bar.

32. Cancel: Cancel button.

1 View Mode

STEP1: Check Signal Strength: shows no communication between GS and MC, please check *Troubleshooting* in *Appendix*. Otherwise communication is constructed, can go to next step.

STEP2: Find Aircraft: Shows LATI, LONGI and ALTI of aircraft, then the aircraft logo will be showed on the map.

STEP3: Altitude Off Set: Click Altitude Off Set , you can just use the value recommended, and click OK. Read the paragraph below to get more details.

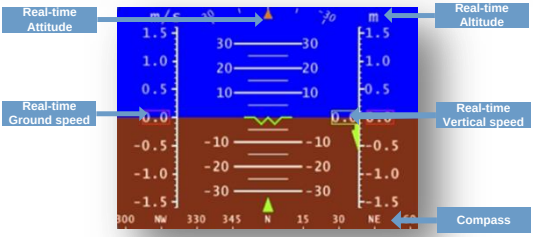
STEP4: Find Home Point: Home point can be found only when GPS signal is good enough. If WKM, Home Point is 20 meters above the aircraft position where user pushes the throttle stick first time; while Ace is 30 meters.

STEP5: Switch Height or Elevation Mode: Height or Elevation Height mode shows relative height, and the 0 meter is the aircraft height when you choose Height mode, above 0 is positive and below 0 is negative. Elevation mode shows height above sea level.

STEP6: View Fly Trace, Instrument Board and State Information: For displaying flight track and aircraft state. Contents are decided by autopilot system. Fig①A will be displayed if you are using WKM; Fig①B will be displayed if you are using Ace. Instrument Board is showed in Fig②.

Fig①A **WKM**

Fig①B **Ace**



Fig②

1.1 System Setting

Tips:

Click DEFAULT to retrieve default parameters.

The system setting includes both Basic Setting and Data Link Setting.

Basic Setting

Sound: If switch on, there will be alarm sound when the radio signal is bad;

Instrument Board Style: Choose different instrument board style ;

Action Setting: Set action number display mode. For example, 3 means that a mark will be displayed every three action intervals;

Pause Mode Control Interval: Time interval of sending commands to the MC when use joystick or keyboard in pause mode;

Target Line: Display a line between aircraft and current target when switch on.

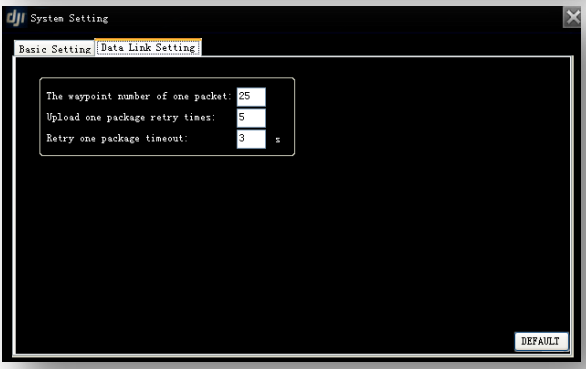
Data Link Setting

Setting parameters for the communication between MC and GS. Usually just keep DEFAULT parameters.

Waypoint number of one data package

Retry times of uploading one package

Timeout of retransmit one data package



1.2 Altitude Offset Setting

- GIS database (Google Earth™) is not precise, while Flight Path Mountain and other obstacle/building collision checking feature performed based on this database, which is not real-time or up-to-date. Google Earth™ plug-in is only for the purpose as a general landscape browser, for quick way points positioning without much safety guarantee.
- Pressure sensor is used for altitude sensing, leading the result varies according to weather. Therefore, you might have different altitude values on the same location at different times. However, its relative height may be far from precise than absolute altitude information in GIS.
- Due to above problems, the following method for relative flight height calculation would be most reliable.

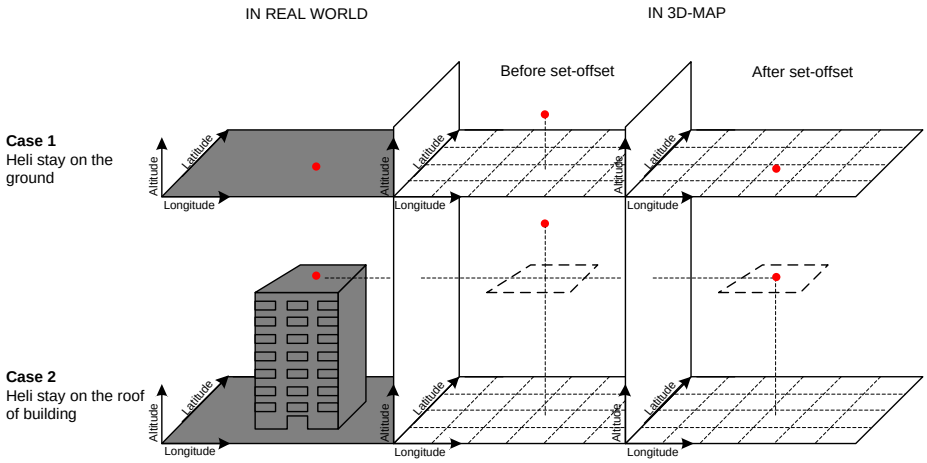
  1) Record the aircraft altitude before take-off, as L_{Gound}

  2) Way point altitude = Relative Flight Height + L_{Gound}

  Please keep in mind that this method is the most reliable way for flight path collision precaution.
- The Altitude Offset value given is only for the purpose to avoid visual confusion, such as Case 1 in fig. ①shown below. The aircraft represented by the red point was located on the ground in real world but floating in the sky within 3D-Map. You have to give a negative offset value to reduce the aircraft altitude for visual effect only. The calculate altitude offset function will give you a suggestion for offset setting but not guaranteed to be correct. Because if the aircraft is landed on the roof of the building as in Case 2 in figure shown below, and the building information will not appear in GIS database, which means you cannot use the same method as in Case 1. You should calculate this offset value with a known or estimated building height.

Tips:

We highly RECOMMEND you to consider the relative flight height we discussed above during your flight mission editing



2 Joystick/Keyboard Mode

Joystick/Keyboard mode is the 2nd permission for users, and Fly Simulation, One Key Takeoff and Joystick/Keyboard functions can be operated.

2.1 Simulator

Our system support Pre-Flight Simulation aims to help you getting familiar with the Ground Station software. A successful flight under simulation mode does not guarantee your aircraft to work successfully in real world, since it is only a virtual environment based on the assumption that your aircraft is working under perfect condition with infinity power supply, favorable weather, and also that the GIS & GPS are providing 100% correct and precise information. The aircraft physical model in simulator might not perform the same flight characteristic as your real aircraft.

Notices:

ENSURE the following requirements whenever during/before Simulation Mode:

1) You MUST NOT takeoff using your aircraft;
2) You MUST NOT turn on your aircraft engine/motor;
3) You CAN disconnect the power supply for electric motor, or disconnect the throttle control servo motor for fuel engine. Otherwise, incorrect operation could result in serious personal injuries.

Please follow the steps strictly for the use of Simulation Mode:

STEP1: Hold Ctrl then right-click, you will see simulate, and the aircraft logo will be at the current mouse position.

STEP2: Click simulate, you will see a “Warning” window.

STEP3: Click Yes to turn on Simulation Mode. Now GS is in Simulation Mode!!!

Notices:

We HIGHLY RECOMMEND Simulation Mode for practicing purpose for flight mission edit, try to get familiar with all the operations of your Ground Station as much as you can.

2.2 One Key Takeoff

Notices:

One key takeoff is a function especially for WKM, that can be used only in autopilot mode and when GPS signal is good.

Messages may be showed as follows:

Successful takeoff message
"The aircraft is auto Takeoff!"
Error messages
"Auto Takeoff failure, GPS is not ready!"
“The aircraft is Takeoffing!"

"Auto Takeoff failure, the aircraft is already flying!"

"Auto Takeoff failure, please switch to auto mode!"

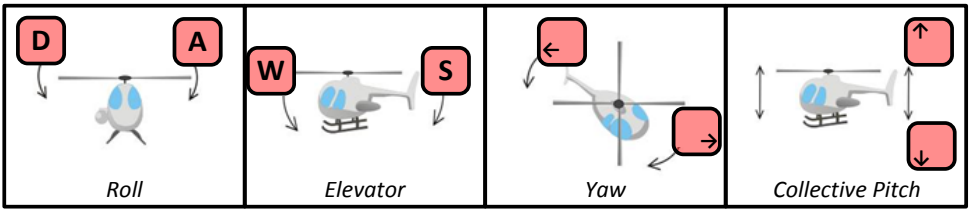
2.3 Joystick and Keyboard

Click Pause, choose joystick or keyboard mode, Fig.① shows that keyboard is chosen, and then key board will be used to control the aircraft.

Fig①

■ Keyboard Mode

The keys W, S, A, D, ↑, ↓ and ←, → are used to control the aircraft. W、 S for Pitch, A, D for Roll, ↑, ↓ for Throttle and ←, → for Rudder. For example, use helicopter to be aircraft model, shown as Fig.②.



Fig②

■ Joystick Mode

➔ Requirement

Joystick control based on a third party hardware controller, you can choose your preferred device based on the two types of joystick indicated below (Fig③).

Type 1: Traditional R/C style flight simulation controller; or your R/C Tx with a third party simulator link.

Type 2: Linear single stick 3D controller.

Fig③

➔ Technology Requirements

- USB connection and at least 4 linear control channels are necessary; otherwise the joystick function will not work properly.
- Use USB connection.

➔ Connection

Joystick → Choose Joystick

Refer to the user manual of the specific controller / Joystick you choose, and ensure the USB cable is properly connected. Please

Notices:

ENSURE the Joystick is properly connected physically, do not disconnect the joystick connection when Joystick Mode is activated.

➔ Calibration

Joystick → Calibration

Steps	Joystick (Type1)	Type1	Type2
Step 1		Place all trim levers (for physical fine turning) in their neutral, or centered position. Click Next to continue.	For Type 2 controller, you might not have these physical fine turning levers. Click Next to continue.
Step 2		Center all the sticks. Click Next to continue.	Center you stick including your throttle. Click Next to continue.
Step 3		Move all of the sticks through their complete range of motion several times. When completed, click Finish.	Move the sticks through its complete range of 3D motion several times, including pitch. When completed, click Finish.

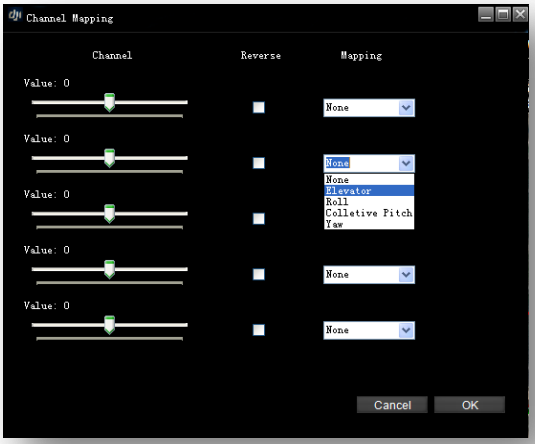
➔ Channel Mapping

Joystick→Channel Mapping

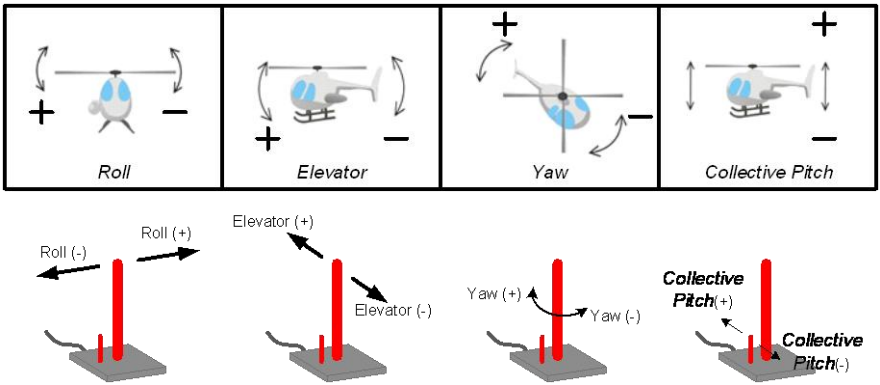
- Each control channel can be reversed, and mapped to one of the control functions listed in corresponding drop down boxes.(Fig①)
- These control function are ‘Roll’, ‘Elevator’, ‘Yaw’ & ‘Collective Pitch’, they represent the cyclic and rudder control of your aircraft. For example, use helicopter to be aircraft model, shown in the

figures below. Where the '+' represents positive channel value, '-' represents negative channel value. (Fig②)

- Push your joystick, and the channel value feedback will tell whether it matches with our suggested joystick control direction or your own settings, and then make your adjustments. For Type 1 controller, please refer to the controller's manual.



Fig①



Fig②

3 Click Go

Click Go Mode is a real-time single waypoint flight mode. Under this mode, you can send a waypoint to your aircraft immediately.

STEP1: Make sure your aircraft is already flying in GPS Atti. or GPS Cruise Mode.

STEP2: Click Tool Box →Click Go Mode to open the window as the figure shows.

STEP3: Click Enter Click Go Mode. Now your aircraft will go into hovering station.

STEP4: Input the Altitude of the waypoint which you are going to set; Input the Speed at which your aircraft is going to fly.

STEP5: Hold the Space key on your keyboard, move your mouse in the 3D map, left click to set the waypoint. Then your aircraft will fly toward this waypoint immediately. You can also set a new waypoint during the flight.

STEP6: Click Exit Click Go Mode, your aircraft will hover again.

STEP7: Click CONTINUE button to continue your previous flight.

Notices:

The aircraft will go into hovering station while the MC isn't receive a heartbeat package from the GS in 5 seconds; The aircraft will go into auto go home while the MC isn't receive a heartbeat package from the GS in a minute.

Tips:

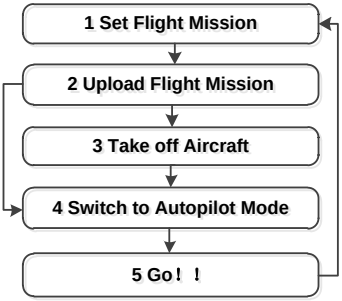
When in the Click Go Mode, all control sticks of the Tx are disabled. To regain control using the Tx, flip the mode switch from Manual mode to Atti, GPS Atti, or GPS Cruise mode.

4 Waypoint (Single Waypoint User Skip This)

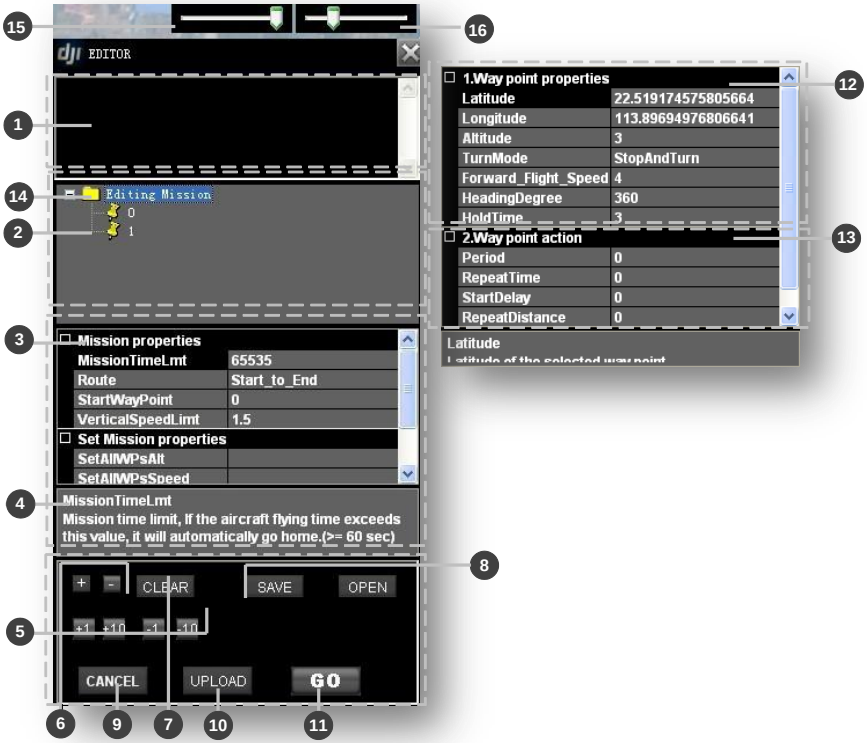
Waypoint package includes Waypoint Mode, Auto Take offing/Landing, F Channel Controller, General Purpose Servo Action, 6 Pre-Programmed Route Templates and Photogrammetry Tool.

4.1Waypoint Mode

See the flow chart to get the information about Waypoint mode operation.



Mission Editor



Instructions

1) LOG to print info. Such as: upload success, upload failed…

2) Waypoint list: you can click the yellow icon to select the waypoint properties in the table.

3) You will see Mission properties if**14)** selected.

➔ Mission properties

- Mission Time Lmt: If the flight-time exceeds the value (>=60sec), it will automatically go home.
- Route: The selection of mission execution mode: includes both modes of Start_to_End and Continuous.
- StartWayPoint: Defines the first way point your aircraft goes to after you click GO. Select the proper way point index number listed.
- VerticalSpeedLimit: Vertical speed for up or down direction, Unit is m/s.

➔ Set Mission properties

- SetAllWPsAlt: Set altitude of all waypoints.
- SetAllWPsSpeed: Set speed of all waypoints.
- SetAllWPsTurnMode: Set turn mode of all waypoints: StopAndTurn, Bank_turn , Adaptive_Bank_Turn and None。
- SetAllAction: Setup the parameters of a set of repeat actions.

4) Description of selected item.

5) Altitude change 10m or 1m per click.

6) Add new way point by click +, and then click on the map. Or left click on the map with Ctrl. Delete way point by selecting them, and then click -.You will delete the selected point.

7) Clear: if you want to delete running mission or editing mission in the map you can click the clear button.

8) Save and Open the mission.

9) Cancel: All edited way points.

10) Upload the mission to Main Controller.

11) Click Go to Execute Assigned Mission, Including Auto Take off as assigned.

12) You will see Waypoint properties (if any items in (2) were selected) for Editing Mission is writeable; Assigned Mission is read only.

➔ Latitude & Longitude: Units are in degree.

➔ Altitude: Unit is in meters.

- ➔ TurnMode: Set the turn mode individually.
- ➔ Forward_Flight_Speed: Velocity from previous point to current point which is limited to <= 25 m/s.
- ➔ HeadingDegree: Heading degree facing this way point, unit in degree.
- ➔ HoldTime: The time to stay at this way point, unit in second.

13) Waypoint Action properties

- ➔ Period: (Unit: second) Setting the time period of the action.
- ➔ RepeatTime: Setting the repeat time of the action assigned.
- ➔ StartDelay: (Unit: second) Setting when to activate assigned servo actions if the flight arrives this way point.
- ➔ RepeatDistance: (Unit: meter.)Setting the repeat action in distance.

15) Set the editor box transparent.

16) Set the editor box size.

(I)Flight Mission Setting

STEP1: Click to open the mission editor, see fig.①.

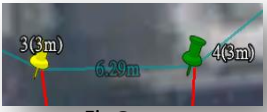
STEP2: Click New to edit a new mission.

STEP3: Add way points.

Fig①

➔ Add way points

There are two way on adding way points. A maximum of 200 way points can be added in the Ace waypoint mode. The waypoint will change to be green if selected, see fig.②.



Fig②

1) Add Point by Point

STEP1: Click + , or press Ctrl。

STEP2: Left click on the 3D-Map where the locations you want to add a way point.

Tips:

Repeat above procedure if you wish to add more new way points. The initial waypoint index will be 0, incremented by 1 each new way point is added. If you want to insert a point before another point, you can move the mouse over the point then press Ctrl with left click.

2) Using Relative Coordinates Editor

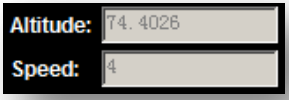
After the first waypoint, you can use Toolbox -> Relative Coordinates Editor to add new points.

STEP1: Select one waypoint, then press Shift + P you will see the input window shown as fig.③;

STEP2: Use tab to switch between these two input frame;

STEP3: Input the relative coordinates: Angle is the relative angle to the north of current waypoint, Distance is the relative distance to the current waypoint;

STEP4: Press Enter, then you will see a new waypoint after the current waypoint.



Fig③

➔ Delete Way Points

STEP1: Select the way point either in 3D-Map or in **Editing Mission** Menu, and the Selected waypoint is in green;

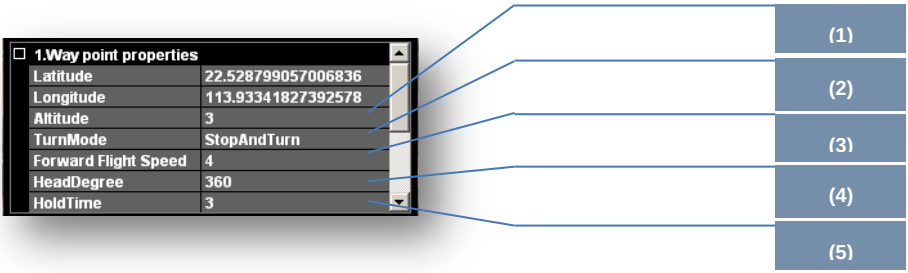
STEP2: Click - or press delete to delete all the way points added.

Tips:

Repeat above procedure to delete more. Click CANCLE to delete all the way points added.

➔ Waypoint Properties Editing

Select the way point in 3D-Map or in the Editing Mission Menu. See figure as following, altitude, TurnMode, Forward Flight Speed, HeadDegree and HoldTime can be set, then press Enter to confirm.



(1) Altitude

The altitude (unit m), if pointed to height mode, means relative height; otherwise altitude mode means the waypoint altitude.

- Edit the altitude of each way points by clicking the Altitude Calibration.
- Type in the precise Altitude figure in the Way Point Properties box.

(2) TurnMode

There are three different turning modes for the aircraft at each way point: Stop and Turn, Bank_Turn and Adaptive_Bank_Turn. The default turning mode in the system is 'Stop and Turn'. You can change it according to the following steps.

The Hold Time in way point property is deactivated if Bank_turnorAdaptive_Bank_Turnis chosen.

- Make a selection from the drop down box after TurnMode for mission execution mode.

(3) Forward Flight Speed

This Speed is the air speed of aircraft flying to specific way point editing. (Unit in m/s).

In Waypoint Mode, the system default speed is 4m/s, and the maximum speed allowed is 25m/s.

- Type in the precise Forward Flight Speed in the Way Point Properties box.

(4) HeadDegree

When the aircraft arrives at a given point where to head towards a certain direction, you can use this value. (Unit in degree).

- Input the degree value in the item.
- Right click waypoint and hold on, move wheel or press ↑, ↓ to change headdegree.

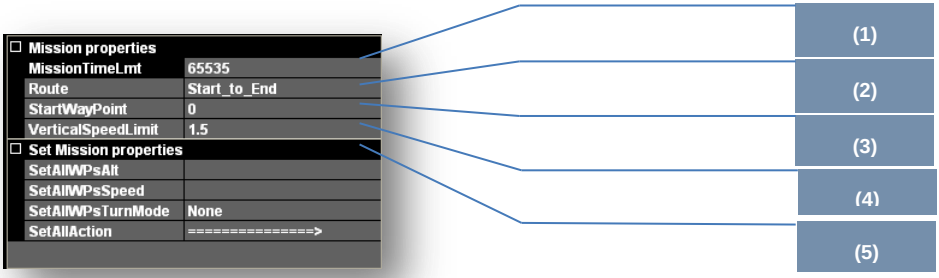
(5) HoldTime

Sets the time to stay in a particular waypoint, not forBank_turn,only for StopandTurn (In second).

- Type in the time to stay in a way point after the TimeHold in the Way Point Properties.

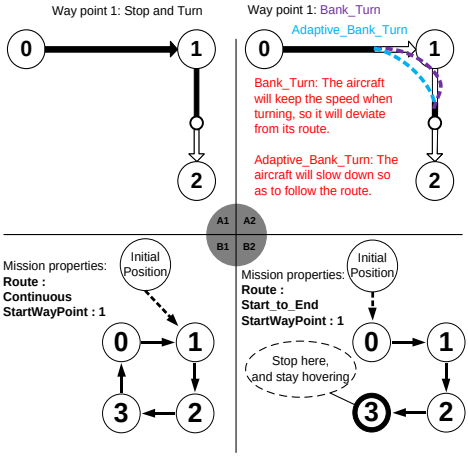
➔ Mission Properties Editing

Click Editing Mission then you can see the figure shown as following, MissionTimeLmt, Route selection, StartWayPoint and VerticalSpeedLimit can be set, and press Enter to confirm.

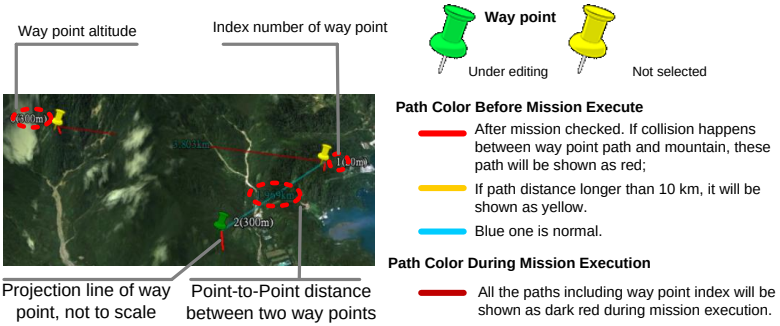


(1) MissionTimeLmt	
If the aircraft's flying time exceeds the value, it will automatically go home. (Default value is 65535sec.Min value is 60sec, Max value is also 65535sec.)	Type in precise time at MissionTimeLmt in the Mission Properties.
(2) Route	
Selection route modes: Start_to_End or Continuous. Start_to_End: execute once from start point to end point; Continuous: repeat from start point to end point. (The default setting is Start_to_End.)	Make a selection from the drop down box after Route for mission execution mode.
(3) StartWayPoint	
Setting for start way point from the existing way point indexes.(The default start way point is 0.)	Make a selection from the drop down box after StartWayPoint from the existing way point indexes.
(4) VerticalSpeedLimitSetting	
This Speed limit is the absolute velocity of aircraft in vertical direction, up or down (Unit in m/s). The default vertical speed limit is 1.5m/s and the maximum speed allowed is 5.0m/s.	Type in precise speed after VerticalSpeedLimit in the "Mission Properties" box.
(5) Set Mission properties	
● SetAllWPsAlt ● SetAllWPsSpeed ● SetAllWPsTurnMode ● SetAllAction	The properties setting above, once set, then all the destinations will change and be the same; if a single waypoint's properties are set individually, then the corresponding waypoint properties will change.

- **Examples for Way Point turning mode:** shown as figure **A1**/**A2** as following.
- **Examples for Mission/Way Point properties setting**: B1/B2Selection for the state of Route, and StartWayPoint.



- **Examples for path of way point:**


Way point altitude
Index number of way point
Way point
Under editing
Not selected
Path Color Before Mission Execute
After mission checked. If collision happens between way point path and mountain, these path will be shown as red;
If path distance longer than 10 km, it will be shown as yellow.
Blue one is normal.
Path Color During Mission Execution
All the paths including way point index will be shown as dark red during mission execution.
Projection line of way point, not to scale
Point-to-Point distance between two way points

➔ Mission Save & Load

Mission Save

STEP1: Click SAVE to save your mission edited;

STEP2: Choose a proper name with extension '.awm'. *For Example: DJI_Mission_20100101.awm.*

Mission Load

STEP1: Click OPEN to load your mission saved; choose your mission file with extension '.awm'.

Notices:

The Altitude offset value will not be saved in mission file. You must set it every time!!!

(II) Upload Flight Mission

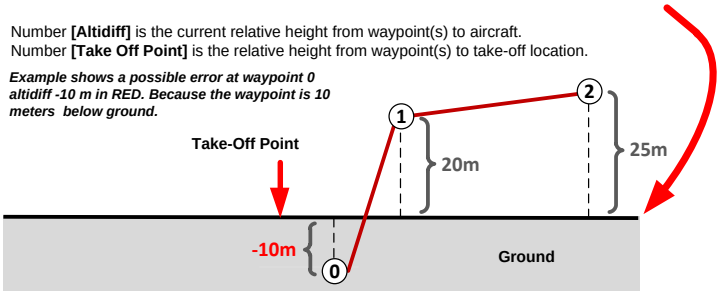
Final Check & Mission Transmitting: Click UPLOAD on the upper bottom of the Mission Editor to send flight mission to DJI Autopilot main controller. Here a mission review table as following example will appear for mission final check. Press OK to confirm, after successfully synchronized, the mission is ready to be executed.

Example of "Mission Review" table under 3 waypoints mission

Waypoint	*Latitude*	*Longtitude*	*Altitude*	*Speed*	*Turn Mode*	*Altidiff*	*Action Module*
0	xxxxx	xxxxx	xxxxx	4	StopAndTurn	-10	NULL
1	xxxxx	xxxxx	xxxxx	6	StopAndTurn	20	In meter
2	xxxxx	xxxxx	xxxxx	15	StopAndTurn	25	In second

Number **[Altidiff]** is the current relative height from waypoint(s) to aircraft.
Number **[Take Off Point]** is the relative height from waypoint(s) to take-off location.

Example shows a possible error at waypoint 0 altidiff -10 m in RED. Because the waypoint is 10 meters below ground.



Tips:

After synchronization, if mission is re-edited, you should re-do the synchronization.

(III) Take off Aircraft

After finishing all the above steps, take off your aircraft in one of 3 modes. If you want to use Auto Takeoff and Landing function, please skip the step 3, go to Step 4 directly. You can take off your aircraft in Manual Mode, please hover it at a suitable height.

(IV) Switch to Autopilot Mode

Switch to the any autopilot mode on your TX. Ground station is able to control your aircraft only after this switching!

Notices:

Making sure sufficient GSP satellite signal is acquired.

Tips:

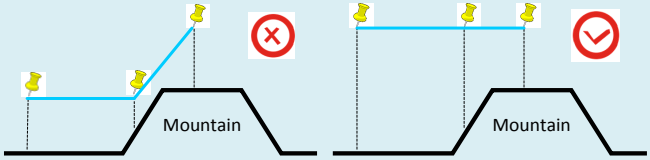
Refer to *DJI Autopilot System User Manual* for Manual, Atti., GPS Atti., GPS Cruise switching of your autopilot system, and also the *Manual* of your R/C Transmitter (Tx).

(V) GO!!

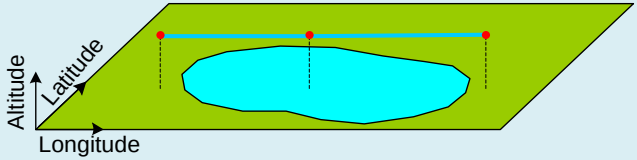
Click Go in the Mission Editor, and the aircraft will fly automatically according to the path you have set in the flight mission.

Tips:

- While a mission is in process, you can still re-edit your mission by using EDIT. Please click EDIT in mission editor to do so.Then the mission editor will return to the state as explained in previous section Flight Mission Setting
- While a mission is in process, you can pause the mission by using PAUSE function. Please click PAUSE, and the aircraft will slow down and stay hovering. Then click CONTINUE the aircraft will resume the un-finished mission.



When you set the waypoints for the aircraft to climb a mountain, please make sure that you leave enough distance between the aircraft and the mountain to avoid collision caused by aircraft air speed.



Please note that when you set a way point above water such as lake/sea/river, the default altitude the map shows will be at the bottom of the body of the water. Please be careful in setting altitude over water.

4.2 Auto Takeoff and Landing

Please read this carefully in order for this feature to work properly. It is imperative that you understand the procedures outlined before executing auto takeoff and landing functions. Users need to obtain Semi Auto Takeoff and Landing permission. But **WKM** has this function built-in.

■ Auto Takeoff

Only after all waypoints are assigned or edited, the mission is ready for taking off.

STEP1: Place transmitter throttle stick to the lowest position. Otherwise, a tip The aircraft is on the ground, but the throttle is not in the lowest position, please do not switch to manual mode! will be shown.

STEP2: Flip the flight mode switch to either GPS-Cruise or GPS-Atti mode.

STEP3: Press Go command on the keyboard, the aircraft main rotor will begin to spool up.

Notices:

Aircraft is ascending to waypoint altitude, please place throttle to mid-stick ! This warning will go away after you place the throttle stick at mid-point, a safety feature in case you accidently bump the mode switch from Auto to Manual.

■ Auto Landing

After completing the mission or when the aircraft returns home, hovering above within visual contact. Use ground station keyboard for auto landing (Press pause button then select keyboard control). Auto Landing button will be available. Use W/S (Pitch), A/D (Roll), ↑/↓(Throttle) and ←/→(Rudder) to navigate to decent landing zone, or allowing Ground Station to decent automatically provided the landing zone is clear of any obstacles. Then you can use ↓ to land your aircraft. After landing, keep holding until engine stop. Or you can simply click Auto landing, aircraft will land then stop engine by itself. In the latter situation, to terminate auto landing, please press ↑ or ↓, or deselect the keyboard control button → .

4.3 F Channel Controller

You can make use of ground station to customize the MC′ s F channel control by yourself, so that you can control the external payloads such as camera and gimbal.

STEP1: Click ToolBox→F_ChannelControl, you will see the setup window as the right figure shows;

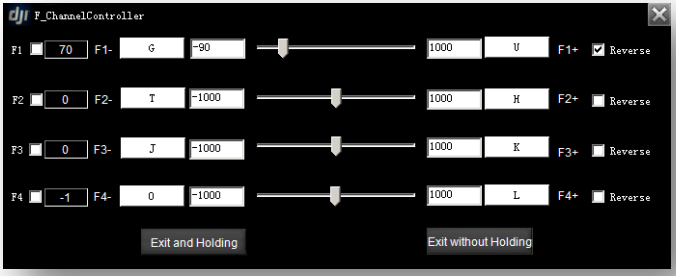
STEP2: Click the small box beside the channel name to choose the channels which you are going to use;

STEP3: Click the button with letter, it will ask you to press key to choose new control key on your key board;

STEP4: Setup the measuring range of the channel in the number boxes;

STEP5: Usually, the left endpoint of the slide represents the minimum value. However you can tick the Reverse box to reverse the measuring range;

STEP6: Click Exit and Holding to exit and keep the range value; Click Exit without Holding to exit and forget the range value.



4.4 General Purpose Servo Action (GP-Servo Action)

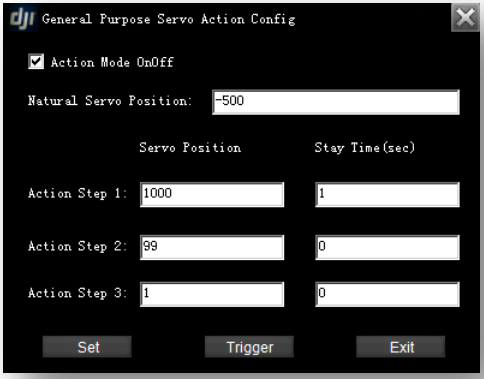
GP-Servo Action is supported by one of the servo output channels in the transmitter, which will work as an interface between DJI Autopilot system and your external devices. This feature allows DJI autopilot to operate your external devices automatically during basic aircraft waypoint mission, as explained in previous sections.

■ GP-Servo Action Setting

STEP1: Click ToolBox→GP Servo Action Config to open the General Purpose Servo Action Config windows;

STEP2: Click the box Action Mode OnOff to enable the GP-Servo Action function;

STEP3: The GP-Servo is using the output channel F4 in the MC.



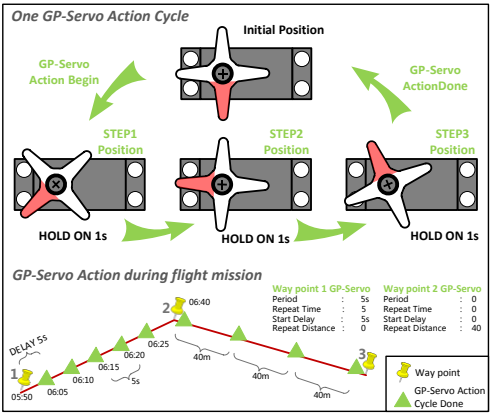
Notices:

The servo position value is from -1000 to 1000; The Stay Time is in second.

Our software aims to let you program four different servo positions, which is defined as:

- Initial servo position and three specific servo working positions;
- Timing of each servo transition in one GP-Servo Action cycle;
- The repeat time of a GP-Servo Action assignment on a particular assigned way point;
- Time gap between each GP-Servo Action assignments.

Please assign a default position for servo in Natural status, and others 3 positions as well as the time to stay in such postions for servo to work as assigned. After all of these settings (click Set to save the settings), then click Trigger you review the GP-Servo Action, as we explained in *One GP-Servo Action Cycle*.



■ Way point Action Editing

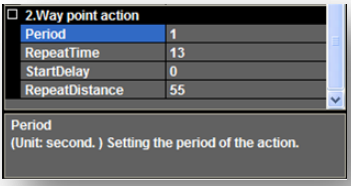
You can find and set the Way point action properties according to the following procedures:

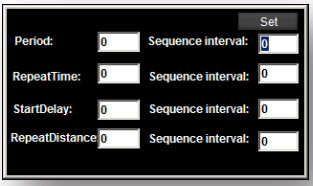
STEP1: Click , the Mission Status will show Editing Mission label upon the Mission Editor.

STEP2: Edit flight mission.

STEP3: Select the way point either in 3D-Map or in the Editing Mission Menu.

STEP4: Give the proper parameters as explained in Mission Editor: Period, RepeatTime, StartDelay, and RepeatDistance. Set RepeatTime and RepeatDistance to zero if you want to disable the GP-Servo Action.





Tips:

You can use SetAllActioninMission properties to setup the sequence interval. For example: 0 means action property is applied to no waypoint; 1 means action property is applied to every waypoint; 2 means action property is applied to every two waypoints; 3 means action property is applied to every 3 waypoints, etc.

4.5 6 Pre-Programmed Route Templates

Use one of the six Route templates to generate points automatically.

STEP1: Open the Template Form Toolbox→Route Template.

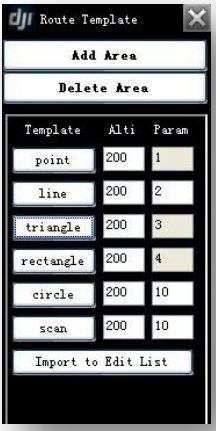
STEP2: Click Add Area button to add an area, and then click the template which you want to generate, as Fig.① shown.

STEP3: The result is shown as Fig.②.

Route Template explanation:

- You can add more than one area which can be moved.
- You can click the area to select or unselect the area. Green area means the area is selected. You can delete the area or generate the points only when the area is selected.
- Click the line template or scan template button twice, the Route waypoints will be assigned vertically or horizontally.
- You can move the mouse over the parameter input box to get meaning of the parameter.
- You can set sea level. You need to ensure that the altitude is higher than the aircraft altitude.

Click Import to Edit List button to finish the template editor, then you can edit the waypoints as before such as add, insert, delete point etc.



Fig①

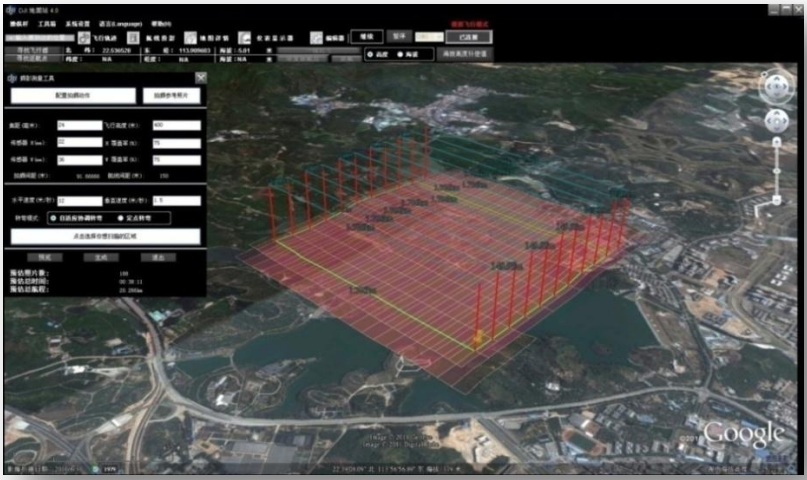
Fig②

4.6 Photogrammetry Tool

Photogrammetry tool is for the user who wants to create the professional maps by aerial photography easily. In order to do that, you just need to setup the servo action and mission path correctly as follows.

Tips:

This tool is actually a functions combination. It simplifies the parameters setup procedure for the aerial photography. You can still setup all the tools introduced before individually for your aerial photography, however that will be very complicated.



STEP1: Click ToolBox→ Photogrammetry Tool to open the setup window.

STEP2: Click Config the shooting action to setup the servo action for the camera shooting action.

STEP3: Click Reference Photo to see if your camera is working as you want.

STEP4: Fill in the right Focal Length, Sensor Height, and Sensor Width according to your camera.

STEP5: Fill in the Fly Height, H Overlap and W Overlap as you like. H Overlap and W Overlap represent the overlap percentage across the sensor height and width.

STEP6: Fill in the flight horizontal and vertical speed in H Speed and V Speed separately.

STEP7: Choose your turning mode between Adaptive_Bank_Turn and Stop and Turn.

STEP8: Click Click to draw a region which you want to scan to choose an area.

STEP9: Click Preview to preview the mission plan.

STEP10: If everything is OK, click Generate to generate all the waypoints. Now you will a flight mission generated automatically in the Mission Editor.

Follow the procedure mentioned before to finish your aerial photography task.

Appendix

List of Ground Station Shortcut Keys

Operation	Function
View Mode	
Left Key+	Up/Down/Left/Right to move the map
↑, ↓, ←, →	Up/Down/Left/Right to move the map
Left Key+	Up/Down/Left/Right to rotate the map
Ctrl + Mouse Roll Up, Ctrl +Mouse Roll Down	Left/Right to rotate the map
Shift + Mouse Roll Up, Shift + Mouse Roll Down	Up/Down to rotate the map
Double click Left Key or Mouse Roll Up	Zoon In the Map
Double click Right Key or Mouse Roll Down	Zoon Out the Map
Joystick/Keyboard Mode	
Ctrl+ Right Key	Start Simulator
Keyboard Mode	
↑, ↓	Throttle
←, →	Rudder
Keyboard Mode	
Blank+ Left Key	Set the Target Waypoint
Waypoint	
Ctrl+ Left Key	Add New Waypoint
Left click waypoint Left click waypoint then Mouse Roll Up or Mouse Roll Down	Head Degree Setting
Left click waypoint then ↑ or ↓	Head Degree Setting
Left click waypoint then then Shift + P	Open the Relative Coordinates Editor

Troubleshooting

Ground Station Launching Failure

➔ Map loading failure and abort

Solution: Choose “run as administrator” when you right click the Ground Station icon in Windows 7

➔ In English version Windows XP, if customer cannot open the program and the following error is reported: system format exception.

Solution: Start→Control Panel→Date, Time, Language and Regional Settings→Regional and Language Options→Regional Options (change to English), senior (change non-Unicode program language into English).

➔ The earth map is not shown up when you launch the Ground Station.

Solution: Try again or use Offline Mode.

➔ If the Connect button is gray and can’t be clicked after launch the Ground Station.

Solution: Please take the following steps to uninstall the Google Earth plugin, Start→ All Program→ Google Earth→ Uninstall Google Earth Plug-in, and then use the installation CD to re-install the Google Earth plugin for DJI.

➔ Communication failure after click the Connect button.

Solution:

- Please choose the right COM port, and make sure that the driver is installed correctly.
- Make sure the transmitter and the receiver of the station are powered on.
- Make sure the transmitter and the receiver are matched; do not change the setup of switches on the radio station.
- Close the Assistant Software to avoid the port confliction.

Instrument Board Failure

➔ The Ground Station launching failure when you click to open the instrument board; the reason is that your computer can’t support the OpenGL.

Solution: You may choose the type2 (shown in Fig.①, ②) in System Setting → Options before you open the instrument board.

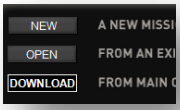
Fig①

Fig②

Ground Station Software Crash

➔ Ground Station Software Crash will not affect the aircraft under mission execution. The aircraft will keep going on the flight mission edited even the Ground Station Software crash. The Ground Station Software can be launched again, but loss of the following information will happen: Altitude Offset value, Aircraft tracks and Way points.。

Solution: Click on the DOWNLOAD button, to retrieve the previously set way points from the DJI Autopilot main controller.



Launch Flight Failure

➔ Aircraft doesn't execute mission after click on GO

Solution:

- If aircraft is in the air, please ensure it is in Autopilot Mode, and there is no need to set center position.
- If aircraft is on the ground and does not takeoff, please use Assistant Software to setup the center position and the throttle servo working range.
- If Auto Takeoff fails, you may take off the aircraft and then land manually in autopilot mode, then wait until throttle cut off automatically; or reboot the autopilot system to initialize the controller.

Action Usage faults

➔ If there is no output change on F4 channel when click on the Trigger in the Action Setting window after connect to main controller.

Solution:

- Please ensure the receiver has been connected.

- Please ensure it is under the Autopilot Mode or Waypoint Mode.
- The action will not be valid unless the value of **"hold time"** is more than one second.

When Wireless Data-Link Doesn't Work…

➔ If your Ground Station cannot be connected with the main controller, please check the following issues.

Solution:

- Make sure you have installed radio driver.
- If the Antenna is broken, the communication distance cannot be guaranteed.
- Two Wireless Data-Link Terminals had been placed too close. The valid communication distance between 2.4GHz wireless data-links should be longer than 1.5 meter; the valid communication distance between 900MHz wireless data-links should be longer than 5 meter.

Data-link LED Introduction

	Function	Introduction
Ground End		
LINK-ALARM	Distance Alarm	Light on indicates distance warning.
LINK-ALARM	Network Light	Light on indicates communication is on with air end.
DATA-POWER	Power Light	Light on indicates working well.
DATA-POWER	Data Light	Light flash indicates data transmit and receive.
Air End		
Link	Data Light	Light on indicates communication is on.
Power	Power Light	Light on indicates working well.
TX	Transmit Light	Light on indicates data transmit
RX	Receive Light	Light on indicates data receive.

Wireless Data-link Specification

	2.4GHz	900MHz
Performance		
RF Data Rate	700kbps	100kbps
Indoor/Urban Range	≤500m	≤1Km
Outdoor/RF Line-of-Sight Range	≤3km	≤10Km
Transmit Power	130mW	1000mW
Receiver Sensitivity (1% PER)	-95dBm	-110dBm
Power Consumption	Ground end: 460mW Air end: 460mW	Ground end: 1600mW Air end: 1500mW
Features		
Frequency Band	2.4GHz(2400MHz ~2483MHz)	900MHz(902MHz ~928MHz)
Serial Data Rate	115200 bps	115200 bps
Antenna Options	SMA	SMA
Operating Temperature	-40 ℃ ~ +85 ℃	-40 ℃ ~ +85 ℃
Operating Humidity	0~95%	0~95%
Size (No Antenna)	Ground end: 70x48x17mm Air end: 51x37x10mm	Ground end: 78x47.8x17mm Air end: 73x42x10mm
Weight (Has Antenna)	Ground end: 55g Air end: 20g	Ground end: 100g Air end: 60g
Power Requirement		
Supply Voltage	4.5V~12V	4.5V~12V
Transmit Current	220mA	1300mA
Receive Current	62mA	100mA
Regulatory Approvals		
FCC (USA)	Yes	Yes
IC (Canada)	Yes	Yes

Ground Station / Wireless Data-link

©2010-2011 Dajiang Innovation Technology Co. Ltd. All Rights Reserved.
6/F, HKUST SZ IER Building, No.9, Yuexing 1st Rd.,
South District, Hi-Tech Park, Shenzhen, 518057, Guangdong, China
Tel: 0086-755-2665-6677 **Sales ext: 201, 202, 203**
Fax: +86-755-8306-7370 **Service hotline: +86-755-2267-3777**
Sales: sales@dji-innovations.com **Technical support: support@dji-innovations.com**
Others: info@dji-innovations.com

Google logo is a registered trademark of Google Inc. DJI is a registered trademark of Dajiang Innovation Technology Co. Ltd. Names of products, brands, etc., appearing in this manual are trademarks or registered trademarks of their respective owner companies. This product and manual are copyrighted by Dajiang Innovation Technology Co. Ltd. with all rights reserved. No part of this product or manual shall be reproduced in any form without the prior written consent or authorization of Dajiang Innovation Technology Co. Ltd. No patent liability is assumed with respect to the use of the product or information contained herein.